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Research Article

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Attention Deficit/Hyperactivity Disorder in Adults with Multiple Sclerosis

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Abstract

Objectives: To determine symptoms and their effects of attention-deficit/hyperactivity disorder (ADHD) in adult patients with multiple sclerosis. Studies of psychiatric comorbidities in patients with multiple sclerosis (MS) have reported greater rates in MS patients than the general population.

Methods: Subjects consisted of 72 relapsing remitting multiple sclerosis patients and 57 controls. Demographic characteristics including age, gender, education level, duration of disease and Expanded Disability Symptom Scale (EDSS) were recorded. ADHD symptoms were assessed by Adult Attention Deficit/Hyperactivity Disorder Self-Report Scale (ASRS). Furthermore, Hospital Anxiety and Depression Scale (HADS) and Short Form-36 (SF-36) were also applied.

Results: MS patients had statistically significant higher the rate of ADHD mean scores compared to controls. Patients with MS had statistically significant higher rate of clinical elevation in ASRS scores. There were 26 MS patients and 4 controls with ADHD symptoms. ASRS scores in MS patients were associated with SF-36 mental and physical component scores and depression and anxiety scores.

Conclusion: ADHD symptoms may develop in adults MS patients and are associated with lowered quality of life and increased psychosocial morbidity. In the future, more comprehensive investigations could clarify origins of ADHD symptoms in adult MS patients.

Keywords

Adult attention deficit/hyperactivity disorder; Self-report scale; Multiple sclerosis; Anxiety; Depression; Quality of life

Introduction

Multiple Sclerosis (MS) is a chronic, autoimmune disease which affects the central nervous system and affects more than 2 million patients in the world. Initially, it usually involves repeated episodes of symptoms including visual loss, impaired balance, limb weakness and paresthesia. Persistent physical and cognitive disabilities usually follow [1]. Psychiatric comorbidities such as depression, anxiety and mood disturbances are increasingly common during disease progression [2] and several studies have shown some degree of affective disturbance in up to two-thirds of patients with MS [3]. Depression is the most common psychiatric comorbidity in MS patients. The lifetime prevalence for depression in MS patients ranges from 37% to 54% and 25% to 36% for anxiety [4].

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder recognized by inappropriate and impaired attention, motor hyperactivity, and impulsivity with difficulties often continuing into adulthood. American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV) has a diagnostic category for ADHD. The diagnosis is based on clinical and psychosocial assessment, developmental and psychiatric history and independent observer reports. Until now psychiatric reports in MS patients frequently concentrate on depression and anxiety. But there has been no study invesigating the relationship between ADHD and MS so far.

The aim of this study was to investigate the relations between disability, disease duration, quality of life and possible symptoms of anxiety, depression and attention deficit hyperactivity in adults with multiple sclerosis.

Materials and Methods

Subjects

The patients were chosen from the registered patients of Neurology Clinic affiliated to the XXXX University, Faculty of Medicine. Doctrines of the actual version of the Helsinki Declaration were followed; ethical committee approval of institution was approved and the process of the trial was explained to the patients. After detailed information, each patient signed an informed consent form.

Seventy two adults with a clinical diagnosis of Relapsing Remitting MS and 57 healthy controls were involved in the study. All MS patients had a diagnosis of multiple sclerosis in accordance with McDonald's 2010 revised criteria [5]. The sample extent of our investigation was selected with regard to our patient population. Previous similar studies were also taken into consideration. As far as possible, age, sex and education levels matched volunteer family members, volunteer healthy workers without history of neurodegenerative and/or psychiatric diseases were taken as controls.

Demographic characteristics including age, gender, education level, disease course and Expanded Disability Symptom Scale (EDSS) were recorded.

Exclusion criteria were as follows; neurodegenerative disease such as Parkinson's disease, dementia, history of anxiety disorder, depression, bipolar disorder, psychosis, epilepsy, substance or drug abuse and mental retardation.

Assessment

Adult Attention Deficit/Hyperactivity Disorder Self-Report Scale (ASRS): The ASRS consists of 2 subscales, inattention and hyperactivity impulsivity, each of which includes 9 items. The ASRS is established on the criteria for ADHD from the DSM-IV. The ASRS is an extended rating scale of 0 to 4: 0=never, 1=sometimes, 2=rarely 3=often, 4=very often. Each material asks how often a symptom happened over the past 6 months on a 4-point Likert scale: 0 for never, 1 for sometimes, 2 for rarely, 3 for often, and 4 for very often [6].

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The validity and reliability of Turkish version of the ASRS has been carried out [7]. Subjects with a total score on the ADHD scale of 36 or greater were accepted highly likely to have ADHD.

Quality of life: Short Form Health Survey (SF-36. Version 1.0, The Health Institute, New England Medical Center) which is the instrument of health-related quality of life was used in our study. The SF-36 evaluates body pain, vitality, social function, general and mental health, the health fields of physical functioning, role limitations due to physical health problems, role limitations due to emotional problems. Those fields can be collected into two summary scores: mental and physical health summary scores [8].

Hospital Anxiety and Depression (HAD) scale: It was performed to determine anxiety and depression levels of the patients. In this scale, there were 14 items related to depression and anxiety (separately 7-item for both). Scores of each item were between 0 and 3; and a total score was between 0 and 21. Cut-off point was 8/21 for anxiety and depression [9].

Statistical Analysis

The computer software (SPSS version 16.0) was used to analyze the results. A $p<0.05$ was accepted statistically significant in this study. Continuous variables were showed in titer of mean and ± SD. Kolmogorov–Smirnov test was used to evaluate the normality of the distribution for all variables. For normally distributed variables, Student's t-test was performed and Mann–Whitney U test was applied for abnormal distributed variables. For categorical parameters, chi-square test and Fisher's exact test was performed. We applied bivariate analyses for Pearson's correlation. We used multiple stepwise linear regression to detect the relative addition of probable confounding factors to total score on the SF-36 in patients with MS.

Results

Table 1 represents the characteristics of MS patients and controls.

Table 1: The characteristics of patients with Multiple sclerosis (MS) and control group.

	Patients with MS (n:72)	Control group (n:57)	P value
Age, years	35.06 ± 9.6	33.38 ± 6.78	0.34
Gender F/M	50/22	32/25	0.11
Education levels			
Primary school	22	11	0.13
High school	32	23	
University	18	23	
ASRS %	36	7	<0.001
ASRS score mean ± SD	28.43 ± 10.84	15.14 ± 7.91	<0.001
SF-36 physical component	60.28 ± 24.37	71.32 ± 20.78	<0.001
SF-36 mental component	55.74 ± 22.84	74.78 ± 19.20	<0.001
Anxiety score	7.65 ± 4.07	4.64 ± 2.49	<0.001
Depression score	7.51 ± 4.43	5.55 ± 2.71	0.009

ASRS: Adult Attention Deficit/Hyperactivity Disorder Self-Report Scale, SF: Short Form

Education levels, distribution of age and gender in both groups were similar.

Compared to control group, MS patients had significantly higher rate of depressive, anxiety and ASRS scores (Table 1).

MS patients revealed significantly decreased mean health summary scores of SF-36 (Table 1).

Significantly higher rate of clinical elevation on ASRS scores were also found in MS patients (Table 1). There were sum scores of 36 or greater in 26 MS patients and 4 controls on the ADHD scale.

ASRS scores in MS patients were associated with physical and mental component scores of the SF-36 and anxiety, depression scores in bivariate analyses (Table 2).

Physical health summary scores of The SF-36 in MS patients were negatively correlated with ASRS scores in multivariate model (Table 3).

Mental health summary scores of theSF-36 in MS patients were negatively correlated with age, EDSS, anxiety score, depression score and ASRS score in multivariate model (Table 4).

Discussion

Our study was conducted as it was hypothesized that an association between ADHD symptoms and disability in MS could be found in adult patients and this is the first study which assessed the relationship between attention deficit and disability in MS.

Our study showed that MS patients had significantly higher rate of mean ADHD scores than controls. Especially, rates of ADHD symptoms were similar between genders in MS patients. Attention has been noticed to be impaired in MS patients [10]. As reported, compared with controls, patients with RRMS showed lengthened reaction times for simple and focused attention [11]. According to our data, compared with controls, patients with MS showed higher attention deficit scores. In this investigation, we focused on symptoms and not DSM-based diagnoses of ADHD. Nevertheless, these findings were in accordance with previous studies.

In our study, we also investigated the relationship with EDSS scores and ADHD scores in MS patients but we did not find any significant correlations between them. Despite that, we showed correlations between ADHD scores and anxiety, depression scores in MS patients.

The questionnaire of SF-36 is a self-performed survey containing 36 materials which takes about five minutes to finish. It evaluates health on eight fields including wellbeing, functional status, and overall evaluation of health [12]. In our study, we found negative correlations between ADHD scores and SF-36 scores. These results show that, with increased ADHD scores, there was deterioration in the quality of life of MS patients.

In any age of onset, attention-deficit/hyperactivity disorder was significantly associated with various psychiatric conditions [13]. In our study, we found higher rates of depression, anxiety and ADHD

Table 2: Correlates of ADHD scores in patients with Multiple sclerosis.

	Disease duration		EDSS		SF-36 –FC		SF-36 –MC		Anxiety score		Depression score	
ASRS score	r	p	r	p	r	p	r	p	r	p	R	p
	0.18	0.12	-0.08	0.47	-0.45	0.001	-0.59	0.001	0.55	0.001	0.38	0.001

ASRS: Adult Attention Deficit/Hyperactivity Disorder Self-Report Scale, EDSS: Expanded Disability Symptom Scale, SF-36 –FC: Short Form- 36- physical component, SF-36 –MC: Short Form- 36- mental component

Table 3: The predictors of SF-36 Physical health summary scores in patients with Multiple sclerosis in multivariate model.

	Physical health	
	β	**P value**
	R^2=0.51	
Intercept		0.001
Age	-0.09	0.35
Education	-0.005	0.96
Disease duration	-0.06	0.51
EDSS	-0.05	0.60
Anxiety score	-0.14	0.19
Depression score	-0.16	0.12
ASRS score	-0.51	0.001

EDSS: Expanded Disability Symptom Scale, ASRS: Adult Attention Deficit/ Hyperactivity Disorder Self-Report Scale

Table 4: The predictors of SF-36 Mental health summary scores in patients with Multiple sclerosis in multivariate model.

	Physical health	
	β	**P value**
	R^2=0.50	
Intercept		0.001
Age	-0.31	0.001
Education	0.13	0.19
Disease duration	-0.11	0.24
EDSS	-0.23	0.01
Anxiety score	-0.22	0.03
Depression score	-0.24	0.01
ASRS score	-0.56	0.001

EDSS: Expanded Disability Symptom Scale, ASRS: Adult Attention Deficit/ Hyperactivity Disorder Self-Report Scale

scores in MS patients and these findings are consistent with the literature.

In this study, we did not find any associations between ADHD scores and disease duration, EDSS scores and these findings suggest that ADHD scores are independent from the duration of illness and disability in MS.

There are some limitations in our study. First of all, our study group was relatively small. Thus, further larger studies are required to confirm these results. And secondly, multiple sclerosis and ADHD could have independent manifestations perhaps related to commonalities in disruption of structural abnormalities determined in both diseases.

In conclusion, ADHD symptoms may occur in adults with MS. Our results showed that reduced quality of life, depression, anxiety and ADHD symptoms may all occur in MS patients. We may suggest that clinicians could evaluate MS patients for possible ADHD symptoms and follow further evaluations when appropriate. Future studies of management for ADHD symptomatology may offer the promise of improving some comorbidities of multiple sclerosis.

Conflict of Interests

The authors report no conflict of interests.

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Statement of Interest

None.

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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